

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Application of : HAYARDENY et al.

Serial No. : 10/673,733 Group Art Unit: 2161
Filed : September 29, 2003 Examiner: Paul Kim
For : STORAGE DISASTER RECOVERY USING A PREDICTED
SUPERSET OF UNHARDEDENED PRIMARY DATA

Honorable Commissioner for Patents
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REPLY BRIEF

In response to the Examiner's Answer, dated April 30, 2009, Appellant respectfully submits the following remarks. These remarks relate to the comments made by Examiner in the Response to Argument section beginning on page 9 of the Answer.

In the Appeal Brief, Appellant cited the well-known directive of MPEP 2143.03: "To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art," and pointed out, for each claim, the limitations that are absent from the cited references and had evidently been overlooked by the Examiner. In the Response to Argument, however, the Examiner persisted in ignoring these same limitations. Appellant will highlight these points briefly in the remarks below.

1) Independent claim 1

Claim 1 recites a novel method of managing data storage, which is implemented in a standard storage configuration in which the storage system includes primary and secondary subsystems. A host processor – which is not part of the data storage system – writes data to the primary storage subsystem. The primary storage subsystem communicates with the secondary storage subsystem in order to copy ("mirror") the data

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to the secondary subsystem. The data are thus stored twice, but they are written by the host processor only once. This sort of configuration is shown and described not only in the present patent application (Fig. 1, for example), but also in the cited art:

“This invention features a system which controls storing of primary data received *from a primary host computer on a primary data storage system*, and additionally controls the copying of the primary data to a secondary data storage system controller which forms part of a secondary data storage system, for providing a back-up copy of the primary data on the secondary data storage system.... For remote *copying of data from one storage system to the other without host involvement*, the primary and secondary data storage system controllers are coupled via at least one high speed communication link ...”
(Yanai et al., U.S. Patent 5,742,792, col. 2, lines 29-41, emphasis added).

The terms “host” and “storage system” (or “subsystem”) are terms of art, with clear, well accepted meanings, as illustrated by their usage in both Yanai and the present patent application.

The distinction between data write operations by the host processor to the primary storage subsystems and internal message and data transfer between the primary and secondary storage subsystems is maintained clearly in claim 1: The secondary storage subsystem maintains a record “which is predictive of locations to which data are to be *written on the primary storage subsystem by a host processor*.” The primary storage subsystem sends “a message... to the secondary storage subsystem so as to cause the secondary storage subsystem... to predict one or more further *locations to which the host processor ... is expected to write the data in a subsequent write operation*.”

The Examiner, however, has persisted in mixing up the roles of the storage system with those of the host processor. In relating to claim 1 in the Answer (last paragraph on page 9), the Examiner equated the predictive record of claim 1 with Yanai’s log file. The function of this log file is described in col. 10, lines 42-57: After receiving and acknowledging data written by the host computer, the primary data storage system maintains a log file of pending data which has yet to be written from the

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primary data storage system to the secondary data storage device. The log file, in other words, lists locations to which the host computer has already written data to the primary system and refers only to internal functions of the storage systems with respect to these locations. The log file is not predictive of future host writes in any way at all, since the host may equally write to a new location or overwrite a location to which it has already written, irrespective of whether the location has been mirrored or not (as indicated by the log file) or whether the location is listed in the storage system as valid or invalid.

The Examiner has held to the same line of confusion with respect to Armangau et al. (U.S. Patent Application Publication 2004/0267836): As explained in the Appeal Brief, Armangau is concerned with producing and maintaining “snapshot copies” of a file system. These copies contain data that have already been written, whether by a host or other entity. The “validity” of a given storage block in Armangau’s bit map refers, apparently, to whether or not the block contents need to be saved (paragraph 0241). Just as in Yanai, there is no connection in Armangau between these bit map storage status records, which control internal functions of the storage system, and choices made by hosts of locations for writing data. The meta bit map referred to by the Examiner (paragraph 0243) simply indicates that a given data block, if invalid, need not be stored before it is written to, but it is in no way predictive of whether a host will or will not write to that data block.

Thus, the cited references do not predict in any way where a host processor is expected to write data, and therefore cannot be taken to teach or suggest the novel use of this prediction in the method of claim 1.

2) Independent claim 10

Appellant pointed out in the Appeal Brief that in rejecting claim 10 together with claim 1, the Examiner had failed to mention or relate at all to the added features recited in claim 10: maintaining a copy of the predictive record on the primary storage subsystem, and deciding at the primary storage subsystem to send a message to the secondary storage subsystem responsively to the copy of the record. The cited

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references do not teach or suggest these added features. In the Answer, the Examiner persisted in ignoring this point.

Appellant therefore reiterates that even if claim 1 were considered to be obvious over the cited references, the Examiner has still failed to make a *prima facie* case of obviousness against claim 10.

3) Dependent claim 3

In the Answer, the Examiner alleged that Appellant had argued features not recited in this claim: specifically, that claim 3 recites only “‘copying the data... asynchronously’ and fails to recite the feature wherein a determination is made as to whether the update should be performed synchronously or asynchronously.” The Examiner has evidently overlooked the point that claim 2 recites copying data synchronously. Since claim 3 depends from claim 2, it incorporates this limitation by reference.

Taking claim 3 together with the claims from which it depends, this claim recites that when the specified location is not in the record, a message is sent to the secondary storage subsystem to update the record, and the data are copied synchronously; but when the specified location is in the record, the data are copied asynchronously (without updating the record). This is exactly the functionality that Appellant argued in the Appeal Brief.

Thus, claim 3 is independently patentable for the reasons argued in the Appeal Brief.

4) Dependent claim 5

In arguing for the rejection of this claim, the Examiner noted that in Yanai, “either a synchronous mode or a semi-synchronous mode (i.e. asynchronous) may be utilized in storing data.” The Examiner appears again to have overlooked the main point of Appellant’s argument: that the primary storage system consults a record of storage locations and decides on the basis of this record when to acknowledge the host write. The Examiner has failed to point to any teaching or suggestion of this sort of

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record in the prior art or this sort of use of the record in selectively acknowledging host writes. Therefore, claim 5 is independently patentable.

5) Dependent claim 12

Here again, the Examiner has failed to relate to the essence of Appellant's argument in the Appeal Brief: Claim 12, taken together with the claims from which it depends, states that one message from the primary to the secondary storage subsystem, indicating that the current write location is not in the record, causes multiple locations, in addition to the current write location, to be added to the record by both subsystems. In relation to this claim, the Examiner did not point to a single passage in either Yanai or Armangau that teaches or suggests adding multiple locations to a record (or setting the corresponding bits) in response to a single message, let alone the specific choice of message and locations recited in claim 12. Therefore, claim 12 is independently patentable.

6) Dependent claim 16

In the Appeal Brief, Appellant argued that the Examiner's rejection of this claim was based on conclusory statements, without support in the cited references or any other rational underpinning. In the Answer, the Examiner has addressed this argument simply by repeating his conclusory statements once again. Appellant asks simply that the Board consider the points made in this regard in the Appeal Brief.

7) Dependent claim 17

Claim 17 recites that the same message causes the secondary storage subsystem both to predictively add locations to the record (per claim 10) and to remove other locations from the record. The Examiner argued in the Answer that Menon et al. (U.S. Patent 6,397,229) describes a method in which a bit corresponding to a certain sector is set, and is then subsequently cleared after the sector is backed up. The bit in Menon, however, refers to no more than a single location, and is presumably set and then cleared in response to different, successive messages. It has nothing to do with the complex

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message and record-keeping functionality that is recited in claim 17. Thus, the Examiner has failed to make a *prima facie* case of obviousness against claim 17.

8) Dependent claim 20

In the Appeal Brief, Appellant pointed out that the cited references do not teach or suggest the use of logical connections between storage objects in predicting future write locations. The Examiner's Answer made no attempt to rebut Appellant's arguments in this regard. It appears, therefore, that the Examiner has accepted Appellant's position that claim 20 is independently patentable.

Summary

For the foregoing reasons, Appellant reiterates that the Examiner's rejection of claims 1-17, 19 and 20 was erroneous. Reversal of the Examiner's decision is respectfully requested.

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09-0468.

Respectfully submitted,

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